USGS
science for a changing world

Eastern Region
Leetown Science Center

Fisheries and Aquatic Resources
Fish Passage

Researchers at Leetown Science Center develop and test fish passage designs and investigate related fisheries issues to assist management and restoration of anadromous and other migratory fish.

Placing tags on fish to track their movements.

Over 75,000 dams are included in the National Inventory of Dams for the United States. Dams prevent or inhibit the free upstream and downstream movement of fishes, particularly anadromous species such as salmon and shad, that spawn in freshwater but grow to maturity in salt water. Catadromous species such as eels with the opposite life history, are also impacted. More recently, strictly freshwater species living in the rivers have also been recognized as requiring effective passage at dams and other barriers.

Dams create barriers to fish movement

Fish passage structure at the Little Falls Dam on the Potomac River.

USGS research is vital for mitigation of passage barriers caused by dams, hydroelectric facilities, culverts, water diversions, or other structures that present partial or complete barriers to fish movement or delays in riverine migration. Restoration of fishery resources in streams and rivers requires this information. During different portions of their life history, fish migrate from feeding areas to spawning areas, and juvenile fish may move between different types of feeding areas as they grow and their food sources change. Their inability or delay in successfully reaching important habitats reduces the productivity of the impacted population and in severe instances may reduce a population to an endangered status if not extinction.

Leetown Science Center's Conte Laboratory, located on the Connecticut River in Massachusetts, conducts research on fish passage by integrating disciplines of engineering and biology to assess passage problems, and to develop applied solutions. The unique flume facility allows for design, construction, and testing full-scale prototype passage

Fish behavior is examined with different passage structures.

Department of the Interior
U.S. Geological Survey
Homepage: http://www.lsc.usgs.gov

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Research Applications

- In collaboration with the Corps of Engineers, Center scientists developed a unique fish passage structure at the Little Falls Dam on the Potomac River. The structure will provide upstream passage for spawning by American shad and other anadromous species.
- An experimental passage device to facilitate general movement of eels past dams (i.e., the "eelevator") has been developed and employed by USGS investigators.
- Restoration of Atlantic salmon in northeastern rivers has been assisted by studies on the appropriate planting time for hatchery smolts; on the quality of hatchery product versus life history needs in rivers; and genetic data on the success of fry and smolt performance in the field.

of full-scale prototype passage structures with actively migrating fishes (e.g., Atlantic salmon, American shad) in a semi-controlled environment. Fish passage research employs state-of-the-art instrumentation for hydraulic measurement and

Fishway Design

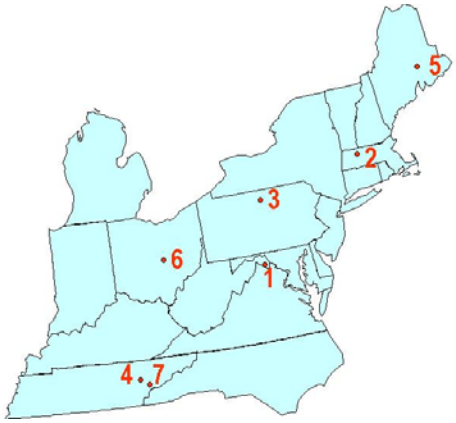
assessment of fish behavior to answer critical questions about passage that have been previously unapproachable, both in the laboratory and field.

Examples of Research

- Design of novel fishways and downstream bypass structures
- Hydraulic and biological. evaluation of existing and new passage structures.
- Evaluation of hydraulic effects of turbine passage (e.g., shear stress, turbulence, strikes) on fish behavior and survival.
- Fish swimming dynamics and energetics related to passage.
- Studies of fish behavior and passage at hydroelectric projects.
- Field evaluation of migratory passage throughout entire watersheds.
- Studies of cumulative effects of multiple passage facilities on fish populations.
- Development of life history information for at-risk migratory species, such as the shortnose sturgeon.
- Stress associated with passage conditions.
- Development of a new method for generating hydropower to circumvent fish passage problems associated with dams and turbine induced shear, strike and grinding forces.

Eel pass at the Greeneville Dam on the Shetucket River, CT.

Location of Center Components



Leetown Science Center (1)
- -Fish Health Branch
- -Aquatic Ecology Branch
- -Restoration Technologies Branch

Conte Anadromous Fish Branch (2)

No. Appalachian Research Branch (3)

So. Appalachian Research Branch (4)

Orono Field Station (5)

Columbus Field Station (6)

Great Smoky Mountain Field Station (7)

U.S. Geological Survey
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